Geophysical Research Abstracts
Vol. 16, EGU2014-9703, 2014
EGU General Assembly 2014

Characteristics of the nocturnal boundary layer inferred from ozone measurements onboard a Zeppelin airship

Franz Rohrer (1), Xin Li (1), Andreas Hofzumahaus (1), Christian Ehlers (1), Frank Holland (1), Dieter Klemp (1), Keding Lu (1,2), Thomas F. Mentel (1), Astrid Kiendler-Scharr (1), and Andreas Wahner (1)

(1) Forschungszentrum Jülich, IEK-8: Troposphäre, Jülich, Germany (f.rohrer@fz-juelich.de), (2) College of Environmental Sciences & Engineering, Peking University, Beijing, China

The nocturnal boundary layer (NBL) is a sublayer within the planetary boundary layer (PBL) which evolves above solid land each day in the late afternoon due to radiation cooling of the surface. It is a region of several hundred meters thickness which inhibits vertical mixing. A residual and a surface layer remain above and below the NBL. Inside the surface layer, almost all direct emissions of atmospheric constituents take place during this time. This stratification lasts until the next morning after sunrise. Then, the heating of the surface generates a new convectionally mixed layer which successively eats up the NBL from below. This process lasts until shortly before noon when the NBL disappears completely and the PBL is mixed convectionally. Ozone measurements onboard a Zeppelin airship in The Netherlands, in Italy, and in Finland are used to analyse this behaviour with respect to atmospheric constituents and consequences for the diurnal cycles observed in the surface layer, the nocturnal boundary layer, and the residual layer are discussed.